

# Lifestyle Habits of Adults During The COVID-19 Pandemic Lockdown in Cyprus: Evidence From a Cross-Sectional Study

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## Research Article

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# Abstract

## Background

The COVID-19 pandemic and widespread control measures disrupted efforts to address lifestyle risk factors for non-communicable diseases (NCD). This study aimed to explore the effects of COVID-19 lockdown on all lifestyle medicine pillars.

## Methods

This was a cross-sectional study on a convenient sample of adults residing in Cyprus during the Spring 2020 lockdown. Participants completed an anonymous online questionnaire incorporating six validated tools regarding the following lifestyle behaviours before and during lockdown: adherence to the Mediterranean diet, physical activity, stress and social support levels, sleep pattern and use of risky substances such as smoking and alcohol. Median total scores for each lifestyle pillar before and during lockdown were compared using Wilcoxon Signed-Rank test and stratified analyses for sociodemographic characteristics were performed.

## Results

Of 745 participants, 74% were female and median age was 39 years. Overall participants reported significantly higher perceived stress score (22 v 25,  $p < 0.01$ ), lower social support score (71 v 68,  $p < 0.001$ ), and worse sleep quality score (4 v 5,  $p < 0.01$ ) during lockdown. Mediterranean diet (MD) adherence was moderate and increased significantly only in those practicing religious fasting (score of 6 v 7,  $p < 0.01$ ). Total minutes spent sitting increased (120 v 180,  $p < 0.01$ ) although overall physical activity score did not significantly change. Smoking intensity increased during lockdown whilst frequency of alcohol consumption decreased ( $p_{\text{trend}} = 0.03$  and  $< 0.01$ , respectively).

## Conclusion

Lifestyle was adversely affected by the COVID-19 lockdown in Cyprus. Evidence from this study supports development of holistic lifestyle interventions during and following the pandemic to reduce short and long-term NCD risks by building on lifestyle behaviour strengths and addressing longstanding and emerging gaps and needs.

## Introduction

The world is currently immersed in a global coronavirus (COVID-19) pandemic (1); yet, globally, non-communicable diseases (NCDs), such as cardiovascular diseases and diabetes, remain notable causes of morbidity and mortality (2). Lifestyle modifiable behaviours, such as unhealthy diets, physical inactivity, tobacco use, and harmful use of alcohol, pose significant risk factors for NCDs (3). Concurrently, lifestyle factors such as smoking, alcohol use, physical inactivity and obesity, have been identified as risk factors for adverse COVID-19 outcomes (4) (5).

Globally, there is concern that the current COVID-19 pandemic has disrupted progress in addressing lifestyle factors to decrease morbidity and mortality (2). Widespread measures to combat the current COVID-19 pandemic that encourage or require social distancing, self-isolation, in-home lockdown, and/or quarantine undermine attempts towards a healthy lifestyle and pose a mental health threat (6). A small but growing number of studies have investigated individual lifestyle habits such as diet, physical activity, stress, sleep and addictions during the first phase of the pandemic and confirmed that lockdown and other important measures to limit virus spread have adversely affected lifestyle habits (7) (8) (9). For example, lockdown measures limited exercise opportunities, reduced physical activity levels, (7) (8), increased food consumption and affected diet quality (9). Furthermore, quarantine has been associated with negative psychological effects, including post-traumatic stress symptoms, with multiple stressors identified, such as longer lockdown duration and financial loss (10). Not surprisingly, the wellbeing of people, in the form of stress, anxiety and sleep disturbances, was also affected (11)(12)(13).

The field of lifestyle medicine is well equipped to address lifestyle factors, as it aims to utilize an evidence-based approach to prevent, treat and even reverse diseases by encouraging healthy behaviours across the six pillars of lifestyle: healthy eating, physical activity, restful sleep, stress management, avoidance of risky substances, and healthy relationships (14). This comprehensive approach of combining healthy lifestyle behaviours is known to be associated with increased disease-free life-years (3).

Globally, various measures, some prolonged, targeting movement restriction, such as lockdown, are still in use. Thus, designing lifestyle interventions based on identified needs during this period is important. Our study aimed to investigate lifestyle changes across all lifestyle pillars in adults in Cyprus during the first phase of the COVID-19 pandemic, where lockdown began 15<sup>th</sup> March and ended 21<sup>st</sup> May 2020 and the general population was forced to stay home with allowance to go out once daily during the first 6 weeks, and 3 times daily thereafter. This study aims to inform relevant stakeholders on the well-being priority needs of a population which practices social distancing

or is in lockdown thereby aiding the design of holistic lifestyle interventions targeting multiple health behaviours both during and after social distancing to reduce the risk of chronic disease in the short and long term.

## Methods

### Design and setting

This was a cross-sectional web-based questionnaire survey conducted between 10<sup>th</sup> April and 12<sup>th</sup> May 2020, designed and performed in accordance with the Declaration of Helsinki. A convenience sample was recruited through social media and institutional and community social network mailing lists. Study participation was anonymous and informed consent was obtained before study enrollment. Following self-completion of the study questionnaire either in the Greek or English language, participants received digital educational material with practical tips on ways to maintain a healthy lifestyle during lockdown.

### Study population

The study population consisted of adults <sup>≥</sup>18 years who were living in Cyprus during the period of the Spring 2020 lockdown.

### Assessment tools

The study questionnaire consisted of six widely used tools validated in both English and Greek in order to assess the six pillars of lifestyle medicine: nutrition, physical activity, sleep, stress, social connection, and risky substance use (alcohol). It also included questions on socio-demographic characteristics of participants, including self-reported height and weight, and questions assessing tobacco use. Participants were asked to provide their responses concerning: (a) February 2020, the month preceding the emergence of coronavirus in Cyprus and (b) the period in lockdown.

The validated tools used were the: (a) Mediterranean Diet Adherence Screener (MEDAS) (15), (b) International Physical Activity Questionnaire (IPAQ) (16), (c) the Pittsburgh Sleep Quality Index (PSQI) (17), (d) Perceived Stress Scale-14 (PSS-14) (18), (e) the Medical Outcomes Study – Social Support Survey (MOS-SSS) (19), and (f) Alcohol Use Disorders Identification Test (AUDIT-C) (20).

### Statistical Analysis

Scores were calculated in line with published tool-specific scoring instructions. Descriptive analyses were performed to calculate absolute and relative frequencies for categorical variables and median and interquartile ranges (IQR) for numerical variables. To evaluate the effects of lockdown on socioeconomic, anthropometric and lifestyle questions, paired before (referring to month of February) and after (referring to the time during lockdown) comparison was undertaken. Wilcoxon Signed-Rank test and Bowker symmetry Test were performed for questions where response was numerical (non-parametric data) and categorical respectively.

Paired before and during lockdown comparisons for MD adherence, IPAQ, PSQI, MOS-SSS and PSS-14 scores were performed for the overall cohort, as well as stratified by independent sociodemographic variables, such as age group, gender, nationality, education level, marital status, number of people living in the household, residence in urban/rural areas, employment status, change in working conditions, baseline household monthly net income and change in monthly income. Lastly, before and during lockdown differences in MD adherence, IPAQ, PSQI, MOS-SSS and PSS-14 scores were correlated between them, while adjusting for age and gender (and fasting status for MD adherence), using partial Spearman's rank correlation. A p-value <0.05 was regarded as significant in all analyses. Statistical analyses were performed using STATA® v.16 (StataCorp., USA) and R statistical software packages.

## Results

### Participant characteristics

The socio-demographic characteristics of the 745 participants are presented in Table 1. Briefly, the median age was 39 years (IQR: 13 years); 73.8% were female. The great majority lived in urban areas (85.0%) and had attained university education at undergraduate (40.0%) or postgraduate level (50.3%). Two thirds of participants were employed (66.3%) and married, living with a partner or in a partner relationship (61.2%). Almost half (46.9%) had a baseline household net-income <2,000 euro per month. During the lockdown, working conditions changed for three in four participants (74.4%). Among them, 39.1% worked more hours, 36.7% worked less hours and 24.3% suspended work. Among those working, 63.8% worked from home, 9.4% went to the workplace, and 18.5% did both. Overall, 74.2% did not report any diagnosed health conditions.

## Comparison of lifestyle habits before and during lockdown

In Table 2, the lifestyle habits of participants are compared before and during lockdown. Most lifestyle habits were adversely affected during lockdown, as indicated by changes in the overall median questionnaire scores and the shift in score distribution towards worsening values (Supplementary Figure 1). Changes in scores within individual areas of each lifestyle pillar are presented in more detail in Supplementary Tables 1-5.

MD adherence remained moderate during lockdown (median 6, IQR 3) although one-third of participants reported a higher score (31.9%) ( $p<0.01$ ). In particular, there was increased consumption of most components of the MD including those healthy (e.g., fruit, vegetables, legumes) and less healthy (e.g., sweet beverages and commercial sweets), whereas preferential consumption of white vs. red meat did not change. Subgroup analyses demonstrated that increased adherence was only significant among participants who started fasting, as per the Greek Orthodox religion, during lockdown. Among these participants (25% of total study population), median MD adherence score increased by 1 unit ( $p<0.01$ ). Of note, Body Mass Index (BMI) increased slightly but significantly during lockdown (24.2 vs. 24.0,  $p<0.01$ ).

As expected, increasing sedentary behaviour was reported by most participants during lockdown (180 vs. 120 minutes sitting,  $p<0.01$ ). However, the overall physical activity score did not significantly change ( $p=0.95$ ); 60% of participants did not report any change and the remaining 40% were split between increased and decreased activity levels. However, there was a significant increase in the average weekly energy daily expenditure in walking during lockdown (Supplementary Table 2, MET (one Metabolic Equivalent - min/week 297 vs. 231,  $p<0.01$ ). In contrast, MET-min/week spent in moderate or vigorous physical activity were lower during the lockdown period, albeit non-significant except in younger participants (18-29-year-old, students).

Being in lockdown was also significantly associated with an increase in perceived stress (25 vs. 22,  $p<0.01$ ). Almost 6 in 10 participants (57.9%) reported higher stress scores during lockdown. Similarly, sleep quality was negatively affected; the median Global PSQI score significantly increased (5 vs. 4,  $p<0.01$ ) and one in two participants reported worsening scores. Moreover, the proportion of participants with poor sleep quality (global PSQI score  $>5$ ) increased during lockdown (40.4% v 26.0%,  $p<0.01$ ). Regarding the individual PSQI score components, all increased during lockdown ( $p<0.01$ ), demonstrating a worse sleep experience, except sleep efficiency, which marginally improved ( $p<0.01$ ). Social support was also adversely impacted: the overall support index decreased significantly in lockdown (68.4 vs. 71.1,  $p<0.01$ ), almost half of the participants (43.6%) reported lower support scores, and a significant decrease was observed in all overall support index components ( $p<0.01$ ).

Pertaining substance use, 43.8% of smokers increased smoking intensity during lockdown ( $p<0.03$ ). In contrast, overall frequency of alcohol consumption decreased significantly ( $p<0.01$ ). Indicatively, 26% of the sample decreased consumption frequency compared to 11.5% who increased consumption, while abstinence also increased (36.2% v 22.3%). Regarding quantity of consumption, even though the number of alcoholic drinks per day did not change significantly ( $p=0.08$ ), more participants reported a decrease rather than an increase in the frequency of binge drinking ( $\geq 6$  alcoholic drinks on one occasion) during lockdown (11.6% vs. 3.1%,  $p<0.01$ ).

Stratified analysis by socio-demographic characteristics (data not shown) showed that sleep, social support and stress scores increased significantly across all socio-economic strata. Physical activity levels decreased in the younger age and student groups. Nonetheless, higher MD adherence was seen in both genders, younger (18-29 y.o) and older age groups (50-76 y.o.), those living in urban areas, and those with higher educational attainment.

## Correlation between differences in lifestyle scores during lockdown

In Table 3, the correlations between before and during lockdown differences in lifestyle scores, adjusted for potential confounders, are shown. Weak to moderate significant associations were observed between perceived stress and sleep quality index, overall support index and perceived stress, and between overall support index and sleep quality index. More specifically, a positive moderate correlation ( $r=0.4064$ ,  $p<0.01$ ) between differences in perceived stress and sleep quality index before and during lockdown, indicating that an increase in perceived stress was associated with worsening sleep quality. Overall support index score difference was negatively correlated with perceived stress difference ( $r=-0.3742$ ,  $p<0.01$ ) and sleep quality index difference ( $r=-0.2253$ ,  $p<0.01$ ), showing that a decrease in the overall support index during lockdown was associated with an increase in perceived stress and worsening sleep quality.

Lastly, significant but very small negative correlations were observed between differences in physical activity score and sleep quality index ( $r=-0.0911$ ,  $p=0.01$ ) and perceived stress ( $r=-0.0794$ ,  $p=0.03$ ). A decrease in physical activity scores during lockdown was associated both with worse sleep quality and increased perceived stress. Significant correlations were not observed between diet scores and any other lifestyle pillars.

# Discussion

## Summary of findings

To the best of our knowledge, our study is the first to investigate changes in all pillars of lifestyle medicine during the COVID-19 pandemic in adults before and during strict lockdown measures. The study findings show most lifestyle behaviours were adversely affected. Specifically, participants reported being more stressed, having worse sleep quality and lower social support. Furthermore, though participants reported eating more in terms of portions, their quality of diet, however, did not seem to change, with average MD adherence score being moderate before and during lockdown. Overall, physical activity score did not change during lockdown; however, there was an increase in energy expenditure in walking along with an increase in time spent sedentary. A large number of smokers reported increased smoking intensity whereas overall alcohol consumption decreased. A significant correlation was observed between some lifestyle behaviours, with more pronounced effects seen between sleep, stress and social support.

## Main body

To date, most studies evaluating lifestyle habits during the COVID-19 pandemic focussed on individual factors such as diet (9), physical activity (8) or psychological health (7) (13) (21). Few have investigated changes in a range of lifestyle habits during lockdown, such as a smaller study in 399 Scottish adults (mean age 32 years) (22).

Regarding diet during lockdown, participants in our study were affected in various ways. Firstly, diet quality, as reported by the MEDAS score, was moderate. Whilst diet quality seemed to improve in some areas but not in others during lockdown, there was an overall improved MD adherence score amongst participants who were fasting, as per the Greek Orthodox religion tradition. This is not surprising since fasting is a plant-based diet, thus closer to the original MD (23). Agreeing with our study, adherence to MD during lockdown was moderate in an Italian study. This study reported an increase in the sense of hunger and appetite as well as perceived weight gain in almost half of the participants (24). Similarly, in another Italian study, half of participants reported higher food consumption as a result of eating more “comfort food” (sweets and salty snacks) but also fruits (9), whereas a study from Poland reported increased snacking between meals especially amongst the obese (25). In the Spanish COVIDiet study, which also assessed adherence to MD before and after lockdown, adherence to the MD increased significantly from 6.53 +/- 2 to 7.34 +/- 1.93. COVIDiet participants with higher MD adherence decreased intake of sweet/carbonated beverages, red meat and pastries by 16–18%, yet increased fruit and vegetable intake by around 12% (26). Similar to our findings, COVIDiet participants with postgraduate education had higher MD adherence.

Pertaining exercise, the average weekly activity score per participant in our population did not change during lockdown, likely partly explanatory is that half the participants had low physical activity levels before the lockdown period. Both the number of participants who spent time walking and the energy expenditure spent walking increased. But this increase in energy expenditure was negated by the decrease in moderate and vigorous physical activity levels, mostly amongst the younger group. Our findings differ with the few studies published to date which generally show a reduction in physical activity levels during lockdown (7) (8) (27). In an online survey of 1471 adults in Australia (7), almost half reported a negative change in their physical activity whereas a study in Italy showed a significant decrease in the weekly MET-min score across all activity categories in 2524 adults (27). Nonetheless, just over 75% of the Italian participants had moderate or high physical activity levels before lockdown and the negative impact of lockdown was mostly seen in these individuals. In contrast, individuals classified as low active before lockdown showed a significant increase in their physical activity levels, probably due to housework. In our population, walking was the only activity that increased during lockdown, which was not seen in other studies. Walking is usually a preferred exercise amongst less active individuals (28) such as in our population. Moreover, in Cyprus during spring, walking was likely a well-suited outdoor activity for families and seniors. Finally, and unsurprisingly, staying at home with a “once a day” allowance to go out led to an increase in the time participants spent sitting and in other sedentary activities, something evidenced by other studies (7) (27).

Sleep, stress, and social support are important interrelated factors in lifestyle medicine (14). During the COVID-19 lockdown, significant associations were reported between them in studies that evaluated stress and sleep (11) and social support and stress (29). To our knowledge, only one other study to-date has evaluated social support, sleep, and stress (30). This smaller study (n=170) in China evaluated persons under self-isolation (30) and showed that low levels of social capital were associated with increased stress, which in turn reduced sleep quality.

In our study, social support decreased during COVID-19 lockdown, which differs from results seen in studies in the US (31) and Egypt (29), where social support increased. This difference may be driven by factors such as timing of the study and degree of lockdown measures as well as societal and cultural differences. Decreased social support in our study was associated with increased perceived stress ( $r=-0.3742$ ,  $p<0.01$ ), related to findings of other studies showing the adverse effects of loneliness and lack of social support on stress and mental health during the COVID-19 pandemic (31) (32) (33). Additionally, our study confirms other findings during the COVID-19 pandemic that higher

perceived stress is associated with lower sleep quality (11) and that the proportion of those with poor sleep quality increased (34). However, though global sleep quality significantly changed in our participants during lockdown (global PSQI score: 4 before vs. 5 during lockdown,  $p < 0.01$ ), it is noteworthy that both before and during lockdown our respondents, overall, had “good” sleep quality (global PSQI score  $\leq 5$ ).

Given the association between stress, anxiety and substance use (35), smoking and alcohol consumption frequency and/or intensity during lockdown were expected to increase in some people due to higher stress levels and decrease in others who smoke or drink socially. Findings from our study confirm the above; 43.8% of smokers increased and 28.1% decreased the daily number of cigarettes smoked during the lockdown. Similarly, the overall frequency of alcohol consumption increased in 11.5% and decreased in 26% of participants, while the number of drinks consumed showed a similar pattern.

Regarding smoking, similar findings have been found in a study conducted during the COVID-19 lockdown in the US, where approximately a quarter of participants reduced smoking and a third increased their motivation to quit, whilst 30% increased their smoking (36). A similar survey conducted across five countries (Italy, India, South Africa, UK, and US) including 6800 smokers under a variety of lockdown measures, found that e-cigarette consumption marginally increased during lockdown (37). The latter study also revealed that in-home smoking increased in Italy and India among exclusive tobacco cigarette smokers. Both studies note that smoking behaviour of participants was also affected by the perception of increased risk of infection or higher COVID-19 disease severity (36) (37). Although we did not assess perceptions of infection related to smoking, it is very likely that our participants who reduced or quit smoking during lockdown had similar concerns or that the strict Cyprus lockdown measures prevented social smoking.

Concerning alcohol, our study findings are in line with an Italian survey reporting a 36.8% reduction in alcohol intake, probably due to reduced social drinking (9). Conversely, a study conducted in Poland reported an increase in alcohol consumption in approximately 14% of participants, although more pronounced in alcohol addicts (25). Similarly, UK evidence on drinking habits during COVID-19 lockdown (38) saw elevation in the proportion of risky drinkers. This is in contrast to our findings, showing a much higher decrease than increase (11.6% vs. 3.1%) in high-risk drinking ( $\geq 6$  alcoholic drinks on one occasion) during lockdown. However, similar to our findings, in the UK study the proportion of people drinking less during lockdown was similar or exceeded the proportion of those drinking more (38). Of note, in our study the proportion of people reporting never drinking increased (36.2% vs. 22.3%).

### **Strengths and limitations**

The study used validated assessment tools to evaluate and compare habits across all lifestyle pillars before and during a strict lockdown in a relatively large group of participants. The convenience sampling method, however, led to overrepresentation of female, well-educated and urban-living participants who were possibly more health conscious. Nonetheless, there was reasonably good representation of all ages (12% of adult population over the age of 65) and income groups (median monthly income in Cyprus in first quadrant of 2020 was 2000 euros) (39). However, despite our population not being representative of Cyprus, the adverse changes in the lifestyle habits seen during lockdown in our study would have probably been more pronounced in a lower socio-economic, less health-conscious population setting, as seen in a study of 1004 participants in Vienna (40).

## **Conclusions**

Our study demonstrated the diverse and interlinked effects of the COVID-19 pandemic and the relevant control measures on all six lifestyle medicine pillars. As the COVID-19 pandemic endpoint is not yet known and measures to control the spread of the SARS-CoV-2 virus, such as lockdown, will continue, the design of interventions to promote positive lifestyle behaviours is crucial. Such interventions should: (a) support maintenance of “good” lifestyle habits, as in the good sleep quality and increased opportunities for walking seen in our population; (b) address longstanding needs and gaps, such as increasing adherence to the MD; and (c) deal with emerging needs, especially regarding the interlinked triad of stress, sleep and social connection. As the short- and long-term effects of the pandemic on chronic diseases are still unknown, supporting development of holistic lifestyle interventions is of paramount importance.

## **Declarations**

### **Ethics approval**

The study received approval by the Cyprus National Bioethics Committee (EEBK EP 2020.01.69) and permission for use of the validated assessment tools by the respective authors.

### **Availability of Data and Materials**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Competing interests

The authors declare no competing interests.

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## Authors Contributions

OK and MM prepared the first draft of the manuscript. OK and EP conceived the study and CD, AQ, MM and AH contributed towards the design. MM supervised the conduction of the study. CD and AQ performed the statistical analysis. All authors assisted in data interpretation and in drafting the manuscript. All authors have read and approved the final version of the manuscript.

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## References

1. Cucinotta D, Vanelli M. WHO Declares COVID-19 a Pandemic. *Acta Biomed* 2020 March 19;91(1):157–160.
2. Kumaresan J, Bolaji B, Kingsley JP, Sathiakumar N. Is the COVID-19 pandemic an opportunity to advance the global noncommunicable disease agenda? *International Journal of Noncommunicable Diseases* 2020;5(2):43.
3. Nyberg ST, Singh-Manoux A, Pentti J, Madsen IE, Sabia S, Alfredsson L, et al. Association of Healthy Lifestyle With Years Lived Without Major Chronic Diseases. *JAMA internal medicine* 2020;180(5):760–768.
4. Vardavas CI, Nikitara K. COVID-19 and smoking: A systematic review of the evidence. *Tobacco induced diseases* 2020;18.
5. Hamer M, Kivimäki M, Gale CR, Batty GD. Lifestyle risk factors, inflammatory mechanisms, and COVID-19 hospitalization: A community-based cohort study of 387,109 adults in UK. *Brain Behav Immun* 2020.
6. Ren X. Pandemic and lockdown: a territorial approach to COVID-19 in China, Italy and the United States. *Eurasian Geography and Economics* 2020:1–12.
7. Stanton R, To QG, Khalesi S, Williams SL, Alley SJ, Thwaite TL, et al. Depression, Anxiety and Stress during COVID-19: Associations with Changes in Physical Activity, Sleep, Tobacco and Alcohol Use in Australian Adults. *International Journal of Environmental Research and Public Health* 2020;17(11):4065.
8. Giustino V, Parroco AM, Gennaro A, Musumeci G, Palma A, Battaglia G. Physical Activity Levels and Related Energy Expenditure during COVID-19 Quarantine among the Sicilian Active Population: A Cross-Sectional Online Survey Study. *Sustainability* 2020;12(11):4356.
9. Scarmozzino F, Visioli F. Covid-19 and the Subsequent Lockdown Modified Dietary Habits of Almost Half the Population in an Italian Sample. *Foods* 2020;9(5):675.
10. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet* 2020.
11. Zhao X, Lan M, Li H, Yang J. Perceived Stress and Sleep Quality Among the Non-diseased General Public in China During the 2019 Coronavirus Disease: A Moderated Mediation Model. *Sleep Med* 2020.
12. Casagrande M, Favieri F, Tambelli R, Forte G. The enemy who sealed the world: Effects quarantine due to the COVID-19 on sleep quality, anxiety, and psychological distress in the Italian population. *Sleep Med* 2020.
13. Castillo, Calle Castillo de Alarcón. Analysis of the stress, anxiety and healthy habits in the Spanish Covid-19 confinement. *Health Science Journal* 2020;14(2):707.
14. Guthrie GE. What Is Lifestyle Medicine? *American journal of lifestyle medicine* 2018;12(5):363–364.
15. García-Conesa M, Philippou E, Pafilas C, Massaro M, Quarta S, Andrade V, et al. Exploring the Validity of the 14-Item Mediterranean Diet Adherence Screener (MEDAS): A Cross-National Study in Seven European Countries around the Mediterranean Region. *Nutrients* 2020;12(10):2960.
16. Papathanasiou G, Georgoudis G, Papandreou M, Spyropoulos P, Georgakopoulos D, Kalfakakou V, et al. Reliability measures of the short International Physical Activity Questionnaire (IPAQ) in Greek young adults. *Hellenic J Cardiol* 2009 August 01;50(4):283–294.

17. Kotronoulas GC, Papadopoulou CN, Papapetrou A, Patiraki E. Psychometric evaluation and feasibility of the Greek Pittsburgh Sleep Quality Index (GR-PSQI) in patients with cancer receiving chemotherapy. *Supportive Care in Cancer* 2011;19(11):1831–1840.
18. Katsarou A, Panagiotakos D, Zafeiropoulou A, Vryonis M, Skoularigis I, Tryposkiadis F, et al. Validation of a Greek version of PSS-14; a global measure of perceived stress. *Cent Eur J Public Health* 2012 June 01;20(2):104–109.
19. Cross-cultural applicability of the Medical Outcomes Study—social support survey as a measure of perceived social support among Greek-Cypriot Mothers. 20th IEA World congress of epidemiology, Alaska; 2014.
20. Saunders JB, Aasland OG, Babor TF, De la Fuente, Juan R, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction* 1993;88(6):791–804.
21. Robinson E, Boyland E, Chisholm A, Harrold J, Maloney NG, Marty L, et al. Obesity, eating behavior and physical activity during COVID-19 lockdown: A study of UK adults. *Appetite* 2020:104853.
22. Ingram J, Maciejewski G, Hand CJ. Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. *Frontiers in psychology* 2020;11:2328.
23. Sarri KO, Linardakis MK, Bervanaki FN, Tzanakis NE, Kafatos AG. Greek Orthodox fasting rituals: a hidden characteristic of the Mediterranean diet of Crete. *Br J Nutr* 2004;92(2):277–284.
24. Di Renzo L, Gualtieri P, Pivari F, Soldati L, Attinà A, Cinelli G, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *Journal of Translational Medicine* 2020;18(1):1–15.
25. Sidor A, Rzymiski P. Dietary Choices and Habits during COVID-19 Lockdown: Experience from Poland. *Nutrients* 2020;12(6):1657.
26. Rodríguez-Pérez C, Molina-Montes E, Verardo V, Artacho R, García-Villanova B, Guerra-Hernández EJ, et al. Changes in Dietary Behaviours during the COVID-19 Outbreak Confinement in the Spanish COVIDiet Study. *Nutrients* 2020;12(6):1730.
27. Maugeri G, Castrogiovanni P, Battaglia G, Pippi R, D'Agata V, Palma A, et al. The impact of physical activity on psychological health during Covid-19 pandemic in Italy. *Heliyon* 2020;6(6):e04315.
28. Lesser IA, Nienhuis CP. The Impact of COVID-19 on Physical Activity Behavior and Well-Being of Canadians. *International Journal of Environmental Research and Public Health* 2020;17(11):3899.
29. El-Zoghby SM, Soltan EM, Salama HM. Impact of the COVID-19 Pandemic on Mental Health and Social Support among Adult Egyptians. *J Community Health* 2020 August 01;45(4):689–695.
30. Xiao H, Zhang Y, Kong D, Li S, Yang N. Social Capital and Sleep Quality in Individuals Who Self-Isolated for 14 Days During the Coronavirus Disease 2019 (COVID-19) Outbreak in January 2020 in China. *Med Sci Monit* 2020 March 20;26:e923921.
31. Tull MT, Edmonds KA, Scamaldo K, Richmond JR, Rose JP, Gratz KL. Psychological Outcomes Associated with Stay-at-Home Orders and the Perceived Impact of COVID-19 on Daily Life. *Psychiatry Res* 2020:113098.
32. Groarke JM, Berry E, Graham-Wisener L, McKenna-Plumley PE, McGlinchey E, Armour C. Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 Psychological Wellbeing Study. *PloS one* 2020;15(9):e0239698.
33. Probst T, Budimir S, Pieh C. Depression in and after COVID-19 lockdown in Austria and the role of stress and loneliness in lockdown: A longitudinal study. *J Affect Disord* 2020 December 01;277:962–963.
34. Cellini N, Canale N, Mioni G, Costa S. Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. *J Sleep Res* 2020:e13074.
35. Fluharty M, Taylor AE, Grabski M, Munafò MR. The association of cigarette smoking with depression and anxiety: a systematic review. *Nicotine Tobacco Res* 2016;19(1):3–13.
36. Klemperer EM, West JC, Peasley-Miklus C, Villanti AC. Change in tobacco and electronic cigarette use and motivation to quit in response to COVID-19. *Nicotine Tobacco Res* 2020.
37. Yach D. Tobacco Use Patterns in Five Countries During the COVID-19 Lockdown. *Nicotine Tob Res* 2020 August 24;22(9):1671–1672.
38. Institute of Alcohol Studies. Alcohol consumption during the COVID-19 pandemic in the UK. Second IAS briefing. Available at: <https://movendi.ngo/wp-content/uploads/2020/10/IAS-2nd-Briefing-on-alcohol-consumption-during-COVID-19-in-UK.pdf>.
39. Cyprus Statistical Service. Demographic Statistics 2019. Available at: [https://www.mof.gov.cy/mof/cystat/statistics.nsf/All/6C25304C1E70C304C2257833003432B3/\\$file/Demographic\\_Statistics\\_Results-2019-EN-301120.pdf?OpenElement](https://www.mof.gov.cy/mof/cystat/statistics.nsf/All/6C25304C1E70C304C2257833003432B3/$file/Demographic_Statistics_Results-2019-EN-301120.pdf?OpenElement).
40. Oberndorfer M, Dorner T, Brunnmayr M, Berger K, Dugandzic B, Bach M. Equally Affected? Health-Related and Socioeconomic Adversities of the COVID-19 Pandemic in Vienna. Health-Related and Socioeconomic Adversities of the COVID-19 Pandemic in Vienna (September 15, 2020) 2020.

## Tables

**Table 1:** Socio demographic and health related characteristics

Socio-demographic characteristics		Total (n=745)*	
		N	%
Gender	Female	550	73.8
	Male	195	26.2
Age	Median (IQR)	39 (13)	
Age groups	18-29	218	29.3
	30-39	162	21.7
	40-49	174	23.4
	50-76	191	25.6
Nationality	Cypriot	603	81.3
	Greek	75	10.1
	European	41	5.5
	Other	23	3.1
Area	Urban area (city)	633	85.0
	Rural area (village)	112	15.0
Educational attainment	Primary (Primary school)	2	0.3
	Secondary (High School)	70	9.4
	Tertiary (University / College at undergraduate level)	298	40.0
	Tertiary (University / College postgraduate or doctoral level)	375	50.3
Employment status	Student	155	20.8
	Unemployed for the whole year	22	3.0
	Unemployed for part of the year	20	2.7
	Employed	494	66.3
	Retired	54	7.2
Marital status	Single	232	31.1
	Married / Living together / Relationship	456	61.2
	Divorced	47	6.3
	Widowed	10	1.3
N. of people in household	Median (IQR)	3 (2)	
Income in euro (in the Month before Lockdown)	<1000	101	15.7
	1000-2000	200	31.2
	2000-3000	175	27.3
	3000-4000	92	14.3
	>4000	74	11.5
Have your working conditions changed during the month in lockdown?	No	95	12.8
	Yes	552	74.4
	Not Applicable	96	12.9

If yes, how have your working conditions changed during the month in lockdown?	Working more hours	211	39.1
	Working less hours	198	36.7
	Not working	131	24.3
If working different hours, has your place of work changed during the month in lockdown?	Working from home only	293	63.8
	Working outside of home only	43	9.4
	Working both from home and outside of home	85	18.5
<b>Health related characteristics</b>			
BMI in month before lockdown	Median (IQR)	24.0 (6.0)	
BMI in lockdown	Median (IQR)	24.2 (6.2)	
Were you fasting during the month of lockdown?	No	559	75.0
	Yes	186	25.0
Do you currently have any diagnosed health conditions?	No	553	74.2
	Yes	192	25.8

\*Missing responses: nationality (3), income in euros (103), Have your working conditions changed during the month in lockdown? (2), If yes, how have your working conditions changed during the month in lockdown? (12), If yes, has your place of work changed during the month in lockdown? (26), Are you currently pregnant? (3) Are you currently breastfeeding? (4)

**Table 2.** Lifestyle habits (Diet, Physical activity, Stress, Sleep, Social connection, Use of risky substances) before and during lockdown

Lifestyle habits	The Month before Lockdown	Lockdown	Change in score** (% of participants)		P value ***
	Median (IQR) *		Decrease	Increase	
<b>Diet</b>					
Mediterranean Diet Score (range: 0-14)	6 (2)	6 (3)	22.7	31.9	<0.01
<b>Physical Activity</b>					
MET	792 (1880)	813 (1815)	37.0	43.8	0.16
Time spent sitting (mins)	120 (340)	180 (466)	14.5	67.1	<0.01
Physical Activity Score (%)					
Low	49.4%	48.9%	21.2	21.5	0.95
Moderate	25.2%	26.3%			
High	25.4%	24.8%			
<b>Stress</b>					
PSS-14 overall score (0-56)	22 (9)	25 (12)	21.7	57.9	<0.01
<b>Sleep</b>					
Global PSQI score (range: 0-21)	4 (4)	5 (4)	25.3	49.1	< 0.01
Sleep latency (0-3)	1 (1)	1 (2)	6.1	40.6	< 0.01
Daytime dysfunction (0-3)	1 (1)	1 (1)	12.3	28.5	< 0.01
Sleep efficiency (0-3)	0 (1)	0 (0)	15.6	14.1	< 0.01
Sleep medication (0-3)	0 (0)	0 (0)	1.2	4.3	< 0.01
Sleep quality (0-3)	1 (1)	1 (2)	10.1	26.8	< 0.01
<b>Social Support</b>					
Overall Support Index (0-100)	71.1 (31.58)	68.4 (36.8)	43.6	18.0	< 0.01
Emotional/informational support	71.9 (37.5)	65.6 (40.6)	28.9	12.5	< 0.01
Tangible support	75.0 (43.8)	75 (43.75)	20.7	13.4	< 0.01
Affectionate Support	75.0 (50)	75 (50)	24.6	9.7	< 0.01
Positive Social Interaction	75.0 (50)	66.7 (58.3)	34.0	11.0	< 0.01
<b>Use of Substances</b>					
Cigarettes, cigars and e-cigarettes (total n)	10 (14)	10 (8)	28.1	43.8	0.03
Frequency of alcohol consumption (%)					
Never	22.3%	36.2%	26.0	11.5	<0.01
Monthly or less	29.4%	27.2%			
2-4 times a month	33.2%	19.9%			
2-3 times a week	10.3%	8.9%			
4 or more times a week	4.8%	7.8%			
Number of alcoholic drinks on a typical day (%)					
0	53.1%	57.5%	13.1	9.1	0.08
1 or 2	39.3%	36%			
3 or 4	6.0%	4.8%			

5 or 6	1.2%	1.1%			
7,8 or 9	0.3%	0.3%			
10 or more	0.1%	0.3%			
Six or more alcoholic drinks on one occasion (%)					
Never	78.6%	88.3%	11.6	3.1	<0.01
Less than Monthly	12.2%	6.3%			
Monthly	6.6%	2.9%			
Weekly	2.5%	1.8%			
Daily or Almost Daily	0.1%	0.7%			

\*Questionnaire Scores for reporting different lifestyle pillar habits are presented as median values (IQR) with the exception of alcohol consumption where the percentage of participants per consumption frequency is presented. The MEDAS score ranges from 0-14, with higher scores indicating higher adherence to the Mediterranean Diet. The IPAQ score, categorizes participants into levels of Low, Moderate and High physical activity. The PSQI score, ranging from 0-21, assesses sleep quality with higher scores (>5) representing poor sleep quality. The MOS-SSS ranges from 0-100 with higher scores indicating higher levels of social support. The PSS-14 score ranges from 1-14, and higher scores are associated with increased perceived stress.

\*\*Change in score refers to the Month in Lockdown compared to February 2020 (i.e. - the Month before Lockdown)

\*\*\*Signrank test was used for the comparison of median questionnaire scores between February 2020 (i.e. - the Month before Lockdown) and lockdown and Bowker symmetry Test for comparison of categorical variables

**Table 3.** Association between lifestyle habits during the month of lockdown (\*)

	Diet score difference n=745	PA score difference n=745	PSQI score difference n=727	MOS-SSS score difference n=745	PSS-14 score difference n=745
<b>Diet score difference</b>	r=1.0000				
<b>PA score difference</b>	r=0.0535 p=0.15	r=1.0000			
<b>PSQI score difference</b>	r=-0.0527 p=0.16	r=-0.0911 p=0.01	r=1.0000		
<b>MOS-SSS score difference</b>	r=0.0402 p=0.27	r=0.0329 p=0.37	r=-0.2253 p<0.01	r=1.0000	
<b>PSS-14 score difference</b>	r=-0.0627 p=0.09	r=-0.0794 p=0.03	r=0.4064 p<0.01	r=-0.3742 p<0.01	r=1.0000

\*Spearman's rank Correlation analysis between score differences - All adjusted for Gender and Age, diet also adjusted for Fasting

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryFigure1FINAL.docx](#)
- [SupplementaryTables15FINAL.docx](#)